EXECUTIVE SECRETARIAT
ROUTING SLIP

TO:

		ACTION	INFO	DATE	INITIAL
1	DCI		X		
2	DDCI		X		
3	EXDIR		X		
4	D/ICS		X		
5	DDI		X		
6	DDA		X		
7	DDO		X		
8	DDS&T		X		
9	Chm/NIC				
10	GC		X		
11	IG				
12	Compt				
13	D/Pers				
14	D/OLL				
15	D/PAO				
16	SA/IA				
17	AO/DCI				
18	C/IPD/OIS				
19	NIO/S&T		X		
20	C/TTIC		X		
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22					

SUSPENSE ______________
Date

Remarks

[redacted]

STAT

Executive Secretary

22 Mar 85
Date

3637 (10-81)

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

MAR 2 0 1985

25 MAR 1985

Honorable Caspar Weinberger
Secretary of Defense
Washington, D.C. 20301

DCI/IC 85-5338

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LOGGED

Dear Cap,

Thank you for your letter of March 1, indicating your support for my proposal that the NSC lead a government-wide effort to deny the Soviet Union and other potential adversaries access to sensitive scientific and technical information through NTIS. I do not believe that this can be accomplished by any means short of a special NSC program, because it is inevitable that new Executive Orders, new national security directives, new legislation and coordinated Government-wide regulations will be required.

My staff has followed the DOD legislation on this issue and it is encouraging to find that Defense has begun to develop a program to control the distribution of sensitive documents. As I pointed out in my January 16 memorandum, however, there is serious reason for concern about slippage between legislative authority and meaningful implementation. While it is true that most of the examples I cited in that memorandum were pre-1982 reports or studies, there is no shortage of post-1981 reports and studies that are of great interest to the Soviets. For example, the NTIS October 84 Tech Data Notes lists dozens of militarily-relevant technology studies (missile nose cones, armor plating, gun bores, acoustic radar, helicopter alloys) and high tech studies (microcircuit manufacturing, VLSIC fabrication, IC software design). The US Army Materiel Development and Readiness Command issued these reports in 1983 and 1984. (A detailed listing is provided at Attachment A). We must begin to put teeth into what so far appears to have been mainly a bureaucratic response. My memorandum to you and other Cabinet officers was generated after several years of effort to instigate action at lower levels failed.

Soviet attempts to obtain the most advanced production techniques are well documented. Efforts to gather information on engineering developments and specifications from reports -- before full-scale production capability -- are of particular interest to Moscow. Thus, reports disseminated through NTIS, such as those in Attachment B, are of the highest interest to the USSR, regardless of the dates published. For example, in the same batch from which we extracted the reports listed in my January 16 memorandum as well as those listed in Attachment B, there is a July 1980 report, Engineering Data for New Aerospace Materials, done for the Air Force Labs at Wright-Patterson by Batelle Columbus Labs. The abstract indicates that the report describes a program to evaluate newly-developed materials produced by different processes of interest to the Air Force. This study, while four years old when available to the USSR, would nonetheless appear to be of significant interest to the Soviet Air Force at the present time.

I am also separately urging Bud to call an NSC meeting as soon as possible.

Sincerely,

Secretary of Commerce

cc: Secretary of State
Attorney General
Secretary of Energy
Director, Central Intelligence
Director, Office of Management and Budget
Assistant to the President for National Security Affairs
Administrator, NASA

Sanitized Copy Approved for Release 2010/02/22 : CIA-RDP87M00220R000200250020-1

MANUFACTURING TECHNOLOGY NOTE

U.S. ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND

Directorate for Manufacturing Technology, Alexandria, Virginia

attachment A

Project Number: MMT H80 9897 JUNE 1984 Filing Code: 491 078

Manufacturing Surface-Acoustic-Wave Devices

Work on an early phase of manufacturing development is described.

A report reviews the manufacturing development applied to two distinct surface-acoustic-wave (SAW) devices:

- A 60-MHz by 60-microsecond down-chirp linearly dispersive filter operating at 200 MHz, on a lithium niobate substrate.
- A two-part 100-kHz-bandwidth resonator operating at 400 MHz, on a quartz substrate.

The devices employ grooved reflective arrays on the piezoelectric substrates. The reflective arrays are formed by an ion-beam etch process. Device specifications are given in the table.

Parameter	Requirement	
	Filter	Resonator
Substrate Composition	YZ - Lithium Niobate	ST - Quartz
Die per Wafer	>3	> 50
Passband Insertion Loss	<40 dB	<5 dB
3 dB Bandwidth	60 ± 1 MHz	100 ± 5 kHz
Center Frequency	200 ± 2 MHz	400 ± 0.01 MHz
Group Time-Delay Dispersion	60 ± 0.5 μs	N/A
Ideal Phase-Frequency Characteristic	Second-Order Quadratic	Linear
Adjacent-Sidelobe Suppression	>25 dB	>20 dB
Measurement Domain	Time	Frequency
Feedthrough Suppression	>50 dB	> 50 dB
Spurious-Echo Suppression	>45 dB	>35 dB

Reflective-Array surface-acoustic-wave devices are used in modern radar and communication systems. The SAW filter and resonator are used in pulse-expansion and pulse-compression lines.

The report, which was prepared for the U.S. Army Electronics Research and Development Command, covers engineering development, the first phase in achieving full-scale production capability. The specific electrical design and test results for both filter and resonator are presented. In addition, the process and assembly procedures planned for the pilot production line are discussed. Finally, the report addresses several engineering tasks that still require technical resolution and will be worked on during the confirmatory sample phase. Quality-control requirements and electrical test plans will be discussed in separate reports.

Considerable attention was focused on packaging the SAW filter. The manufacturing cost was greatly reduced because the crystal fabrication and package sealing and rework steps were simplified.

FOR ADDITIONAL INFORMATION:

You can learn more details about this technology by ordering the NTIS report(s):

SAW Resonator and Reflective Array Devices.
Order number: AD-A129935
Price code: A09

Order from:

National Technical Information Service
5285 Port Royal Rd.
Springfield, VA 22161

THE TECHNOLOGY FOR THIS IS THE SAME AS FE 1586 A.

NTN84-0743

A B C D E F G H J K

NTIS Tech Notes October 84

0001 Advanced Aluminum Alloy Forged Helicopter Parts: Intermediate thermal/mechanical treatment improves alloy properties

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 83 *(H)*

Aluminum alloy die forgings made from specially-prepared forging stock have shown promise for use in some highly-stressed helicopter parts, according to an investigation conducted for the U.S. Army Aviation Research and Development Command. The forging stock is prepared by a sequence of kneading-type preforging operations and heat treated alloy forging was equivalent to or greater than that of the 2014-T6 forgings now used in production.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086819, price code: A04.

0003 Bearings and Seals for Helicopter Transmissions: Test results indicate improved bearings and seals for advanced helicopter transmissions

Army Materiel Development and Readiness Command,
Alexandria, VA.
Apr 83 *(F, H)*

A study evaluated improved bearings and magnetic seals for advanced helicopter transmissions and drive systems. Results of the bearing-material test program have indicated that the high-hot-hardness carburizing steel can be used for integrated gear and bearing components in advanced helicopter transmissions. The advanced analysis of complex bearing structures demonstrated the usefulness of a spring-gap model as a means of obtaining an accurate bearing internal-load distribution due to structural stiffness.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A080675, price code: A13.

0235 Doubly-Rotated Cut Quartz for SAW Devices: Improvements in temperature stability are made

Army Materiel Development and Readiness Command,
Alexandria, VA.
Nov 83 *(B, H)*

Theoretical and experimental results are available from a two-phase program to develop doubly rotated quartz possessing superior surface-acoustic-wave (SAW) properties. The work was conducted for the U.S. Army Electronics Research and Development Command. Conventional, Singly-rotated cut quartz exhibits a frequency/temperature dependence too high for applications requiring environmentally-hardened SAW filters, oscillators, and resonators. The first phase the program applied theoretical techniques to identify program applied theoretical techniques to identify promising angular orientations for cutting the quartz substrates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110663, price code: A09 or contact project officer A. Ballato (201)544-2773.

0014 High-Modulus Composites for Helicopter Shafts: Candidates are screened for impact resistance, stiffness, and low weight

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 83 *(H)*

Various fiber-reinforced plastic composites are under consideration for use in the construction of helicopter tail-rotor drive shafts. A materials screening program and a design, fabrication, and test program and being conducted by the U.S. Army Armament Research and Development command. The objective of the latest phase of this work is to overcome the brittleness of a previously-developed graphite composite shaft, which provided a 53.1-percent savings in weight over the aluminum shafts currently in use. Of the 38 composites tested, 2 showed exceptional performance - 1 consisting of E-glass fibers woven in an epoxy resin matrix and the other consisting of Kevlar-49, or equivalent, fibers woven in the same epoxy matrix.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086349, price code: A07 or contact project officer Charles C., Wright (201) 328-3469.

0017 Making Airfoils From Braided Composites: Improvements include lower cost and increased resistance to damage
Army Materiel Development and Readiness Command, Alexandria, VA.
Jan 83 *(G, H)*

An improved process for manufacturing helicopter rotor blades has been developed for the U.S. Army Aviation Research and Development Command. The blade is designed with an advanced aerodynamic shape and is fabricated with composite tubular braiding/epoxy. Detailed blade-spar design was done in an iterative program of braiding trials to define fiber orientions, coupled with blade design and analysis.

FOR ADDITIONAL INFORMATION: You can learn more details about this technology by ordering the NTIS report AD-A109377, price code: A05 or contact project officer Mark L White (314)263-1625.

0288 Standard Transistor Arrays: Random-logic, integrated MOS digital circuits are generated
National Aeronautics and Space Administration, Washington, DC.
Oct 83 *(A, B)*

Connections between the transistors in a gate, and connections between gates, occur with such frequency that good physical solutions may be extremely complex. Achieving a good physical solution is especially important in the design of digital large-scale-integration (LSI) circuitry. The Standard Transistor Array (STAR) design system is a semicustom approach to generating random-logic integrated MOS digital circuits. The primary program in the STAR system is CAPSTAR, the STAR Cell Arrangement Program. CAPSTAR is augmented by an automatic routing program, a display program, and a library of logic cells. Input to CAPSTAR consists of a description of circuit cells and interconnections. The programs in STAR are written in BASIC and FORTRAN IV for batch execution and have been implemented on a Xerox Sigma V.

FOR ADDITIONAL INFORMATION: Contact Computer Software Management and Information Center, Suite 112 Barrow Hall, Athens, GA 30602.

0293 Surface-Acoustic-Wave Frequency Synthesizer: Synthesizer will operate in the 1,533-MHz frequency range with 3-MHz step size
Army Materiel Development and Readiness Command, Alexandria, VA.
Aug 83 *(B)*

The second of a two-part program is under way for the development of surface-acoustic-wave (SAW) technology for the U.S. Army Electronics Research and Development Command. SAW oscillators were developed to be incorporated in a microwave frequency synthesizer for the second part of the program. The use of SAW devices improves switching speed, step size, total achievable bandwidth, and the stability of synthesizes at reduced size, weight, and power consumption(5W).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A086336, price code: A03 or contact Project Officer Thomas Aucoin (201) 544-2452.

0298 Status of Hybrid Microcircuit Manufacture: Report summarizes materials and assembly techniques used for making microcircuits and includes thick-film and thin-film technologies
Army Materiel Development and Readiness Command, Alexandria, VA.
Jan 83 *(B, G)*

The present status of hybrid microcircuit manufacturing is described in a report prepared by the U.S. Army Electronics Research and Development Command. The microcircuits combine active and passive components for analog, digital, and microwave applications. All aspects of their manufacture are covered, which include design considerations, the selection of materials, fabrication and assembly techniques, packaging, and testing procedures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A097000, price code: A02 or contact project officer Isaac H. Pratt (201) 544-2308.

C274 Production of Microwave Acoustic Delay Lines: Improved design provides wider tolerances for production process parmeters

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 *(B, G)*

A program to develop low-cost production techniques for reliable, rugged bulk acoustic wave delay line has resulted in an improved design for the delay lines which uses mosaic transducers and monolithic impedance matching. The program was conducted for the U.S. Army Electronics Research and Development Command. The design improves the performance at reduced costs and allows greater flexibility in the manufacturing process. Mosaic transducers are formed by dividing the active area into sections, which can be connected in series or in parallel, resulting in a significant reduction in the interaction between input impedance and insertion loss. The feasibility of the design was demonstrated using a computer-linked photolitographic process to produce engineering samples.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A197339, price code: A07.

C243 Hierarchical Graphics Software for IC Design: Modular structure algorithms improve computer processing efficiency

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 *(A, B)*

A technique to improve design automation processes for IC's involves the use of hierarchically modular processing to partition the design into an easily handled structure. The algorithms performing hierarchically modular processing were developed by the U.S. Army Electronics Research and Development Command. Previous graphic techniques have imposed restrictions on circuit geometries and lead to poor processing efficiency due to the large data storage required. The software incorporating the hierarchically modular processing is designed for use on a dot-matrix printer/plotter and can be used for multilevel simulation, module placement and connector routing, design rule and connectivity checking, and documentation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109507, price code: A03 or contact project officer Henry Rielesamen (201) 544-4258.

C252 Mathematical Models of VLSIC's: Models of fabrication processes, devices, and circuits are being developed

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (B, J)

compared with those of the original circuit-board artwork. From these data, a minimum line-width limit is determined for each combination of photoresist, photoresist thickness, and etchant.

FOR ADDITIONAL INFORMATION: Detailed Information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103990, price code: A02 or contact project officer Adolph J. Edwards (202) 394-2755.

Fabricating a Microcomputer on a Single Silicon Wafer: Proposed fabrication would reduce microcomputer packaging costs

See 0193

C231 Computer-Aided Design of Microwave Antennas: Time and expense can be significantly reduced

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 *(A, B)*

A computer program has been developed for the design and simulation of linear-array microstrip antennas for transmitting and receiving signals at microwave frequencies. The work was conducted for the U.S. Army Electronics Research and Development Command. Microstrip-array antennas have the advantages of ease of fabrication, low cost, light weight, and structural conformability. The computer program, which uses a transmission-line network to represent a multi-element linear array, allows the designer to vary any one or more of the antenna-design parameters and to observe such results, as changes in the radiation pattern or amplitude distribution. The program also offers options for considering the effects of reflections due to impedance mismatch at each element, patch directivities du to the broadside gain of each element, insertion phase, ar compensation for insertion phase.

FOR ADDITIONAL INFORMATION: Detailed informatic about the technology described may be obtained by orde ing the NTIS report, order number: AD-A117399, pric code: A02, or contact project officer Morris Campi: (20 394-3443.

Correcting an Electron Beam in IC Processing: Computer program provides correction for scattering in electron-beam lithography

See 0537

0309 Effects of Composite Materials on Avionics Equipment: Report suggests ways of coping with the absence of a built-in electromagnetic boundary

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 *(B, H)*

A report discusses the effects of advanced composite materials on avionics equipment. It identifies major problem areas; namely, lighting and electromagnetic pulse protection, the deterioration of antenna performance, electromagnetic interference and electromagnetic compatibility, and the reduction of radar cross section. Possible solutions to these problems are presented. The report, which was prepared for the U.S. Army Aviation Research and Development Command, devotes a separate section to problems peculiar to helicopters. Appendixes present technical background on interference control and electromagnetic environmental effects. An extensive bibliography is included.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A104015, price code: A07 or contact project officer F. Cansler (314) 263-1635.

0537 Correcting an Electron Beam in IC Processing: Computer program provides correction for scattering in electron-beam lithography

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 *(B, G)*

An analytical correction technique improves the geometrical distortion resulting from the scattering of electrons during the patterning of IC resists. Development of the method was conducted for the U.S. Army Electronics Research and Development Command. The scattering of electrons, also known as the proximity effect, seriously compromises the

bricability, and component interchangeability, a hybrid design was chosen for the leaf springs consisting of alternating leaves of steel and fiberglass/epoxys a graphite/epoxy tube with adhesively bonded steel and sleeves.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A112770, price code: A11 project officer Avery H. Fisher (313) 574-6478.

0720 Low Cost Insulator

Department of the Air Force, Washington, DC.

Jun 83 *(H)*

The development of a low cost insulation material for protection against rocket exhaust was investigated by the Air Force Rocket Propulsion Laboratory. The investigation verified the feasibility of developing an insulation material by using inexpensive ingredients. Analyses and testing revealed that by using an inexpensive filler mixed with a polymer, curing agent and cure catalyst, the mixture could be used to protect structures and facilities against rocket exhaust. Further investigation has revealed that a formulation using carbon black will produce the optimum results to achieve the goal of protection against rocket exhaust. The insulation material is very easy to mix and requires nothing special in the preparation.

FOR ADDITIONAL INFORMATION: Contact: TSgt Ernest B. Toscano, AFRPL/MKPA, Edwards AFB, CA 93523; (805) 277-5430.

Lubricating High-Temperature Engines: Reacting gases produce a solid lubricant

See 0158

Machnozzle Fabric Predryer: Device operates effectively and economically

See 0589

0721 Manufacturing Porous Stainless-Steel Nose Tips: Sintering conditions are chosen to obtain the required gas permeability

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 *(G, H)*

Techniques used to fabricate transpiration-cooled nose tips for missiles may prove useful in the general manufacture of porous metal parts. In a program conducted for the U.S. Army Materials and Mechanics Research Center, tips of the specified geometry and gas permeability were made from

sintered 316L stainless-steel powder. Fabrication begins with the pouring of the powder into an oversize mold. The mold is help upside down and vibrated to assure uniform compaction of the powder. The exact sintering conditions, such as powder coarseness, pressure, sintering time, and sintering temperature, are selected to impart the required porosity or gas permeability to the sintered billet.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087837, price code: A06, or contact project officer G.F. Pittinato (617) 923-3523.

[illegible] **Materials for Gas-Mask Fabrication: Thermoplastic polyurethanes show promise for molding lenses, facepieces, and unimasks**

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 *(G, H)*

A study by the U.S. Army Armament Research and Development Command reports on alternate materials for fabricating XM-29 gas masks. The information may be of use to manufactures of industrial gas maks, safety equipment, diving equipment, or plastic optics. Particular attention was given to thermoplastic polyurethanes for molding lenses and other parts. Of these, the aromatic polyethers were the most promising, with enough strength to maintain lens shape after molding and with sufficient optical clarity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A101301, price code: A06 or contanct project officer John Scavnicky (301) 671-2448.

[illegible] **Armor Design Based on Material Properties: A model allows the steel microstructure to be matched t the expected stress**

Army Material Development and Readiness Command, Alexandria, VA.

Mar 83 *(H, J)*

The behavior of a rolled homogeneous steel armor and a penetrator alloy is described in terms of a matehmatica model in a report prepared by the U.S. Army Armament Research and Development Command. The model is basec on the nucleation, growth, and coalescence of cracks anc is used to study the main features of failures caused by stress waves. The report also proposes a method of designing a material to resist spallation that is based on the crack-nucleation and growth-rate equations of the model. Equations were developed to describe fractures with stress waves, the spallation of low-alloy nickel/chromium rolled steel armor, and the dependence of fracture on material parameters.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090421, price code: A02, or contact project officer Gerald L. Moss (301) 278-6043.

0652 **Warm and Cold Forging of Gun Tubes: Equipment and energy are reduced**

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 *(G)*

Cold and warm radial forging has been successfully used to form large gun tubes in experiments conducted by the U.S. Army Armament Research and Development Command. Previously, such tubes were produced only by hot forging and conventional machining. Cold and warm forging costs less than hot forging because the workpiece-heating requirements are reduced. The energy-saving feature may be very practical to aircraft, automotive, machine-tool, and other metal-processing industries.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A1190690, price code: A02 or contact project officer Vito Colongelo (518) 266-5827.

[illegible] **Graphite/Epoxy Reinforcement for Gun-Barrel Extension: Modified extension gives greater accuracy**

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 *(H)*

Gun-barrel extensions can be made lighter and stiffer by replacing the outer part of the metal with advanced composite material, according to a report of the U.S. Army Materials and Mechanics Research Center. The drooping of the extended barrel under its own weight contributes to the dispersion of emerging projectiles. To increase the stiffness/weight ratio and reduce these effects, the outer metal of the extension was machined away, to be replaced with a graphite/epoxy composite. The new extension was 14 percent lighter and showed greater stiffness, faster vibration damping, and lower round dispersion than the all-metal version. Similar benefits could be obtained by applying the composite-material technology to other artillery components as well as to a variety of aircraft, ground vehicles, and other structures requiring high strength/weight ratios.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090386, price code: A02 or contact project officer Robert Lewis (617) 923-5351.

0761 Texture Strengthening of Armor Plates: The A-286 austenitic steel appears to be most promising from the standpoint of texture strengthening

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 *(H)*

The U.S. Army Materials and Mechanics Research Center sponsored an experimental and theoretical study of face-centered cubic (f.c.c.) materials, such as 7039 aluminum, 5-percent Ni alloy steel, and A-286 precipitation-hardened austenitic steel, for possible texture-strengthening effects. Texture configurations (110) and (111) were identified as the strongest contributors to the through-thickness strength; i.e., ballistic resistance. A computer program was developed for calculating Taylor factors from pole-figure data by incorporating the spatial crystallite-orientation distribution function.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090464, price code: A05, or contact project officer Antone Zarkades (617) 923-3111.

ATTACHMENT B

--Frequency Scanning Radar Concepts for Army High Energy Laser Weapons, April 1982;

--Properties of Evaporated Fe-Co Alloy Films (Ring laser and gyroscope applications), April 1982;

--Sharp Nose Lens Design Using Refractive Index Gradient, June 1982;

--Magneto-optic Materials for Biasing Ring Laser Gyros, April 1982;

--Materials Research for Advanced Inertial Instrumentation, February 1984